بسم الله الرحمن الرحيم

عنوان المحاضرة: Perthes' disease - Slipped Upper Femoral Epiphysis

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Legg – Calve – Perthes' Disease:

-A syndrome in which an avascular necrosis affects the capital epiphysis of the femur, which is resorbed and replaced by new bone.
-Mechanical properties of the femoral head are altered, the head tends to flatten and enlarge.
-The head slowly remodels until skeletal maturity is achieved.

Vascular anatomy:

1-The extracapsular arterial ring (from femoral artery)
2-The ascending cervical branches (retinacular arteries)
3-The arteries of the ligamentum teres

Incidence:

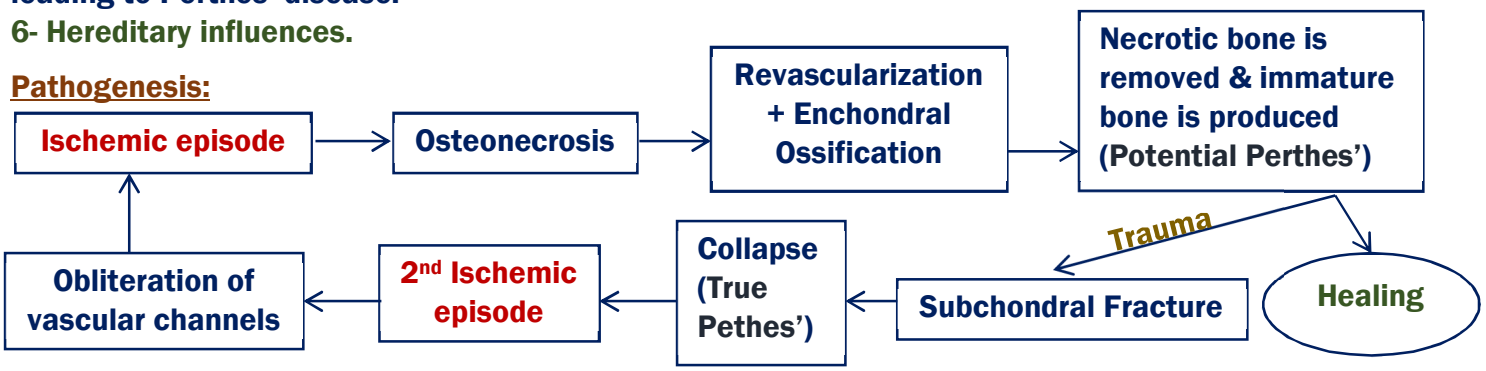
-Age: It usually occurs between the ages of 3 and 12 years.
-Sex: Boys > Girls (5 : 1)
-Side affected: right and left sides is approximately equal. The condition is bilateral in 20%.

Etiology: The etiology of Perthes' disease is still unknown.

Theories:

1-Vascular Theory: General decrease of blood flow in the affected hip. With only one source of blood, lateral epiphyseal vessels.
2-Abnormal venous drainage of the femoral head and neck.
3-Synovitis: lead to increase intracapsular pressure.
4-Trauma: Lateral epiphyseal artery become susceptible to disruption, if there was trauma to this area.
5-Coagulation Defects: Thrombophilia may result in thrombotic venous occlusion of the femoral head leading to Perthes' disease.
6- Hereditary influences.

Pathogenesis:



Pathology:

-Initial period: 4 – 6 months -Fragmentation: 12 – 24 months -Healing: 2 years

Diagnosis:

A) Symptoms:

1-Limping
2-Pain: -Located in the groin, anterior hip region, or laterally around the greater trochanter.
-There often is referred pain to the knee.
3-There may be a history of trauma several months earlier.
3-A family history of LCPD is rare.

B) Signs:

1-The range of motion:

-Early in the disease, only slight loss of motion is noted at maximum abduction and internal rotation.

-Later with severe disease, there is greater loss of motion.

2-The Trendelenburg test: Positive in some cases.

3-The child's gait: is a combination of antalgic and a Trendelenburg gait.

Radiological

1-Widening of the joint space 2-Porosis of the metaphysis 3-Flattening of the bony nucleus

4-The ossification center is smaller than normal

5-A convex rounded enlargement develops at superior, lateral margin of the femoral neck

6-Translucent area in the medial metaphyseal zone

7-Enlargement of neck of femur close to epiphyseal plate

8-Thickening of epiphyseal plate 9-Gage's sign: (V shaped defect laterally)

10-A subchondral fracture may be visible in the upper and lateral part of the head

Classification:

A) Catterall Classification:

Group I	**Approximately 25 % of the femoral head is involved**
Group II	**Nearly 50 % of the femoral head is involved.**
Group III	**Approximately 75 % is involved**
Group IV	**The entire femoral head is involved.**

B) Lateral pillar (Herring) classification

Group I	**No loss of height in the lateral pillar**
Group II	**Partial collapse (less than 50 %) of the lateral pillar**
Group III	**More than 50 % collapse of the lateral pillar.**

Treatment:

A) Observation: **Clinical and radiographical evaluation, at 2 to 4 month intervals**

B) Non Containment:

1-Prolonged bed rest 2-Bed rest with traction 3-Bed rest with immobilization

4-Non-weight bearing without containment

C) Containment:

-Means keeping the softened part of the femoral head within the acetabulum so the acetabulum can act as a round mold and help keep the femoral head round.

1-Non Surgical:

-Splings & Springs -Pertie cast -Slater Stirrup crutch -Toronto brace

-Atlanta Scottish Rite orthosis -Tachdjian abduction brace

2-Surgical: (As all above are proved to be impractical)

-Femoral Varus Osteotomy:

Proximal femoral osteotomy in the intertrochanteric region, redirection of the head, then held in place with plate & screws

-Salter Osteotomy:

Open wedge osteotomy of the ilium that redirects entire acetabulum so that its covers femoral head

-Lateral Shelf Acetabuloplasty:

Use a graft from the iliac bone to create a shelf over the acetabulum so that↑ joint surface and stabilize the femoral head

D) Surgical ttt for deformity:

-Muscle release, abduction cast. -Combined femoral & innominate osteotomy. -Chiari osteotomy.

E) Recently, Arthrodiastasis: **by External Fixator (Technique developed by Dr. Mohammad himself)**

Complications:

1-Lower Limb Length Inequality 2-Relative Overgrowth of Greater Trochanter and Coxa Breva
3-Hinged Abduction of the Hip 4-The Incongruous Hip

Slipped Upper Femoral Epiphysis:

Definition: This is a disease of adolescence which affects the epiphyseal plate of the proximal femur.
**The epiphyseal plate is responsible for growth in length of the femur.

Pathology:

-During the rapid growth of adolescence, the strength epiphyseal plate may be reduced to such a level that it is unable to resist the normal stresses to which it is subjected.
-As a result the head of the femur and the shaft lose their normal relationship.
-The capital epiphysis is well supported by the acetabulum. But the femur tends to externally rotate and move proximally under it.

Incidence: -Age: 11-14 years -Boys > Girls -Often bilateral -Many of those affected are overweight.

Etiology:

A) Hormonal disturbance theory:
Hormonal disturbance (Deficiency of sex hormones - excess of growth hormone) → leads to change in histological appearance of growth plate → weakening.
B) Traumatic theory

Diagnosis

A) Clinically:
1-Pain: which may be felt in the groin or referred to the knee. 2-There is usually a marked limp.
3-In severe cases it may not be possible to bear weight. 4-There is no systemic disturbance.
B) Examination:
1-The affected hip is usually seen to be held in external rotation.
2-There is invariably restriction of internal rotation and abduction is often also impaired.
C) X-ray:
1-Disturbance in the relationship between the capital epiphysis and the femoral neck and shaft.
2-Both hips should be visualized not only to allow them to be compared but also to help detect an early slip on the symptomless side.
3-The first signs appear in the lateral projections

- A line drawn up the center of the femoral neck *no longer passes* through the middle of the base of the capital epiphysis.
- Later, A line drawn along the lateral aspect of the femoral neck *fails to cut* the epiphysis.
- In a chronic slip: new bone forms below the neck.

Classification:

1-Acute slips: the history is short (under three weeks).
2-Chronic slips: the history is of many weeks' duration.
3-Acute on chronic slips: a history of intermittent limp and discomfort in the hip for several weeks with recent, sudden deterioration.

Treatment:

-High risks of avascular necrosis of the head of the femur (by disturbing its blood supply).
-For this reason forcible manipulation of the hip in an attempt to obtain a reduction must be avoided.
-Similarly, operative reduction must be performed with great care to avoid stretching or division of the blood vessels.

-If the slip is less than 30% → the displacement may be accepted and the epiphysis fixed internally with either AO screws or Knowles pins. (Fixation in situ)

-If the slip is greater than 30%, and recent (i.e. an acute slip or an acute on chronic slip):

- A gentle manipulative closed reduction may be tried.
  If this is successful in reducing the deformity to less than 30% → fixation in situ.
  If closed reduction is unsuccessful, then operative reduction and internal fixation may be attempted.
- Bearing in mind the risks of avascular necrosis.

Complications: 1- AVN 2- Osteoarthritis